

UNITED STATES UTILITY PATENT APPLICATION
FOR

ROOM EXPANSION SYSTEM

INVENTED BY
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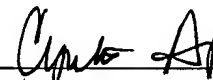
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ROOM EXPANSION SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Patent Application 60/391,821 filed on June 26, 2002, which is hereby incorporated by reference.

BACKGROUND

[0002] In order to increase the available interior space of a motorized or towable vehicle such as a motor home or trailer, slide-out rooms can be made integral with the vehicle. When the vehicle is in transit, the slide-out room can be retracted and stored in the vehicle's interior with the exterior wall of the slide-out room approximately flush with the vehicle's exterior. As such, there is typically adequate space within the vehicle's interior to accommodate users in transit and remain within the standard width limitations imposed upon a vehicle. When the vehicle is parked and leveled, the slide-out room is then slid outward through an opening formed in a sidewall of a fixed room, increasing the internal accommodations.

[0003] A typical slide-out room usually includes a floor section, a roof section, a first sidewall section, a second sidewall section, and a third sidewall section. In the retracted position, the roof section and the first and second sidewall section are concealed from exterior view, and the third sidewall section forms a portion of the vehicle's sidewall. At the same time, the floor section of the slide-out room typically rests above a floor section of a fixed room and may form a portion of the usable interior floor during vehicle transit. Similarly, the roof section of the slide-out room may define the interior ceiling of that part of the vehicle during transit. The proximal ends of the roof section, first sidewall section, and second sidewall section, include stop walls. As used herein, "proximal" refers to the portion towards the vehicle body and "distal" refers to the portion away from the vehicle body. The stop walls form a L-shaped configuration with the respective roof section, first sidewall section and second sidewall section. The stop walls engage the inner surface of a

respective sidewall section of the fixed room when the slide-out room is fully extended, and thereby limit the travel of the slide-out room. Weather sealing material, as in compressible strip form, is located on the abutting surfaces of the stop walls and/or inner surface of the respective sidewall of the fixed room.

[0004] A number of slide-out extension mechanisms are currently used to extend and retract the slide-out room. Typically, a slide-out extension mechanism includes a pair of support rails which telescopically extend and retract from a pair of channels. The support rails are attached to the slide-out room and the channels are attached to the fixed portion of the vehicle, such as the fixed room, wherein the slide-out room retracts and extends with the retraction and extension of the support rails. The support rails may be driven hydraulically, pneumatically, electrically or various combinations thereof. In the fully extended position, the support rails extend outwardly in a cantilevered manner and support the slide-out room. The slide-out room is further supported by the stop walls abutting the inner surface of the respective sidewall section of the fixed room.

[0005] Previous slide-out mechanisms utilize manual hand-crank devices located outside the slide-out room. While functional, a user is forced to stand outside the slide-out room to operate the manual crank. This leaves the user exposed to possibly extreme weather conditions such as heat, cold, rain, snow, sleet, hail, and wind.

[0006] Previous motorized slide-out mechanisms place the motor on the outside of the slide-out room. This positioning can leave the motor exposed to the elements, decreasing its lifespan. Other designs provide an outer compartment for the motor, embedded into the room. While this compartment design protects the motor from the weather, the compartment reduces the interior space of the slide-out room.

[0007] Although these prior art slide-out extension mechanisms are useful, there remains a need for an improved slide-out mechanism that allows a user to extend a slide-out room from the interior of the room. There also remains a need for an improved slide-out mechanism that allows a user to easily attach a motor without requiring a significant amount of interior space.

BRIEF SUMMARY

[0008] The slide-out mechanisms described herein are generally composed of two components. More specifically, the slide-out mechanism includes at least one elongated member, also referred to as a ram, which is coupled to the floor of a movable room. This elongated member moves with the extendable portion of a movable room. Additionally, the slide-out mechanism includes a base that is coupled to the coach floor and contains a motive device located in the interior of the room for extending and retracting the movable room. According to various embodiments disclosed herein, the motive device may be a hydraulic, pneumatic, or electrical motor. Alternatively, the motive force may be a crank that may be manually actuated to extend and retract the slideout room.

[0009] In one aspect of the invention, the slide-out mechanism is composed of an elongated, rectangular ram having two opposing sides extending downward, terminating in an inwardly angled lip. A geared rack extends the length of the ram, located between the opposing sides. The ram slides lengthwise over a base member which is attached to the floor or wheel well of a vehicle. The base member contains a mounted vertical gear that couples with the gear rack of the ram. The base member is mounted at a 90 degree angle to the expanding direction of the extending room area, allowing the ram to slide lengthwise over the base member in the direction the room area is intended to expand. A motive device such as a motor or crank is mounted to the ram and further connected to the ram via an acme screw, providing the force to extend the room. The crank can be located in a cabinet or hidden behind a façade for aesthetic purposes. The optional motor can be mounted to the bottom of the ram or another easily accessible position. Both motor and crank can be coupled to the mechanism at the same time, giving the user a backup extension method in case of motor failure.

[0010] In another exemplary embodiment, two ram/base member sliders can be used. A leader ram possesses the motive device while a parallel follower ram lacks a motive device and instead is connected to the leader ram through a cross shaft. The cross shaft is coupled to the gear assembly of each of the base members. As the gear assembly of the

leader base member rotates, the cross shaft also rotates. This causes the gear assembly of the follower base member to rotate, engaging the gear rack of the follower ram, moving the follower ram in unison with the leader ram.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] These and other details of the invention will be described in connection with the accompanying drawings, which are furnished only by way of illustration and not in limitation of the invention, and in which drawings:

[0012] Fig. 1 is an upper view of one embodiment of the room expansion system;

[0013] Fig. 2 is a top-level view of one embodiment of the room expansion system;

[0014] Fig. 3 is a rear plan view of one embodiment of the room expansion system;

[0015] Fig. 4 is a side view of one embodiment of the room expansion system;

[0016] Fig. 5 is a bottom view of the leader elongated member and an upper view of the base member;

[0017] Fig. 6 is a bottom view of the following elongated member and an upper view of the base member;

[0018] Fig. 7 is an enlarged view of the leading elongated member with an electric motor.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] The present invention is a system for expanding slide-out rooms integrated into vehicles. Referring to Fig. 1, a leading base member **100** has a leading mounting bracket **102** and a leading geared sliding bracket **101**. As best seen in Fig. 4 and 5, a leading base gear **400** is mounted to the leading geared sliding bracket **101** with its axis parallel to the extending room wall **200**. The leading mounting bracket **102** is mounted to a protruding

wheel well **201** in the bed of a vehicle. The leading geared sliding bracket **101** is mounted to the upper horizontal portion of the leading mounting bracket **102** and may additionally be affixed to the top surface of the wheel well **201**.

[0020] Figs. 1-5 illustrate a leading elongated member **103** having opposing sides with an inwardly angled lip. A leading gear rack **501** is mounted between the opposing sides of the leading elongated member **103** and is substantially parallel to both. A manual crank **104** connects to an acme screw **500**, allowing a user to grip the manual crank **104** and rotate the acme screw **500**. As seen in Fig. 5, the acme screw **500** extends from an opening in the leading elongated member **103**, substantially parallel to the leading gear rack **501**, to an acme nut **502**. The acme nut **502** is mounted to the leading geared sliding bracket **101**, in line with the acme screw **500**. The acme screw **500** extends through the acme nut **502**. As the acme screw **500** rotates, the threads on the acme screw **500** urges a force on the corresponding threads in the acme nut **502**, thereby causing movement of the leading elongated member **103** relative to the leading base member **100**, depending on the direction of rotation. The end of the leading elongated member **103** opposite the manual crank **104** is affixed to an external wall **200** of the movable portion of an extendible room as seen in Figs. 2 and 4. The opposing sides and inwardly angled lip of the leading elongated member **103** allow it to slidably engage with the leading geared sliding bracket **101**, so the leading base gear **400** engages with the leading gear rack **501**. The manual crank **104** is located in the interior of the slide-out room (not pictured), allowing operation from inside the room. The manual crank **104** may be located in a cabinet or behind a façade for aesthetic purposes.

[0021] As seen in Figs. 1-4, a cross shaft **105** is coupled to the leading base gear **400** and to a following base gear **600**. This allows the following base gear **600** to rotate in unison with the leading base gear **400**.

[0022] As seen in Figs. 1-4 and 6, a following base member **106** has a following mounting bracket **108** and a following geared sliding bracket **107**. As best seen in Fig. 4 and 6, a following base gear **600** is mounted to the following geared sliding bracket **107**

with its axis parallel to the extending room wall **200**. The following mounting bracket **108** is mounted to a protruding wheel well **201** in the bed of a truck. The following geared sliding bracket **107** is mounted to the upper horizontal portion of the following mounting bracket **108** and may additionally be affixed to the top surface of the wheel well **201**.

[0023] Figs. **1-4** and **6** illustrate a following elongated member **109** having opposing sides with an inwardly angled lip. A following gear rack **601** is mounted between the opposing sides of the following elongated member **109** and is substantially parallel to both. An end of the following elongated member **109** is affixed to an external wall **200** of the movable portion of an extendible room as seen in Figs. **2** and **4**. The opposing sides and inwardly angled lip of the following elongated member **109** allow it to slidably engage with the following geared sliding bracket **107**, so the following base gear **600** engages with the following gear rack **601**.

[0024] In operation, the manual crank **104** is turned by hand from the interior of the slide-out room, rotating the acme screw **500**. As the acme screw **500** rotates, it exerts a force on the threads of the acme nut **502**, thereby moving the leading elongated member **103** relative to the leading base member **100**. As the leading elongated member **103** moves, the leading gear rack **501** rotates the leading base gear **400**. In turn, the leading base gear **400** rotates the coupled cross shaft **105** which further rotates the following base gear **600**. The rotation of the following base gear **600** moves the following gear rack **601** and thus the following elongated member **109**. The movement of the leading elongated member **103** and following elongated member **109** push or pull the external wall **200**, extending or retracting the expandable room.

[0025] Referring to Fig. **7**, an alternative embodiment replaces the manual crank **104** with an electric motor **700**. The electric motor **700** is mounted between the opposing sides of the leading elongated member **109**. This positioning allows for minimal or no reduction in the interior space of the slide-out room. The operative end of electric motor **700** is coupled to the acme screw **500**, providing an alternative motive force for extending the

movable portion of the room. Alternatives to the electric motor **700** include hydraulic or pneumatic devices.

[0026] It is understood that the preceding description is given merely by way of illustration and not in limitation of the invention and that various modifications may be made thereto without departing from the spirit of the invention as claimed.